

Energy Skate Park Activity Instructions and Rubric  
AP Physics

28 Points Total

1. Click two check boxes: Potential Energy Reference and Show Pie Chart. To find quantitative answers, use the measuring tape. Move the Potential Energy Reference line to the bottom of the curve.
  - a. (2 points) Where is the kinetic energy the maximum? Give both qualitative and quantitative answers.
  - b. (2 points) Where is the potential energy the maximum? Give both qualitative and quantitative answers.
  - c. (2 points) Where are the kinetic and potential energies equal? Give both qualitative and quantitative answers.
  - d. (1 points) Click the Energy vs. Time button to bring up the graph, and draw the shape on your paper.
2. Change track to 'double-well' by adding another section of track and making a W shape. Make the middle hump high enough that the skater does not come off the track when it goes over the hump, but not so high that the skater does not make it over the hump.
  - a. (2 points) Where is the kinetic energy the maximum? Give both qualitative and quantitative answers.
  - b. (2 points) Where is the potential energy the maximum? Give both qualitative and quantitative answers.
  - c. (2 points) Where are the kinetic and potential energies equal? Give both qualitative and quantitative answers.
  - d. (2 points) What are the kinetic and potential energies at the top of the middle hump? Give both qualitative and quantitative answers.
  - e. (1 points) Click the Energy vs. Time button to bring up the graph, and draw the shape on your paper.
3. When the skater does not land smoothly, energy is transformed from mechanical (rolling) to thermal. Create a jump that produces the minimum amount of thermal energy, and draw the jump on your paper.
  - a. (2 points) Where are the potential and kinetic energies the maximum? Give a qualitative answer.
  - b. (2 points) Where are the potential and kinetic energies the minimum? Give a qualitative answer.
4. Create a second jump that produces the minimum amount of thermal energy, and draw the set of jumps on your paper.
  - a. (2 points) Where are the potential and kinetic energies the maximum? Give a qualitative answer.
  - b. (2 points) Where are the potential and kinetic energies the minimum? Give a qualitative answer.

5. Click the Reset button to reset the simulation, then click the Track Friction button. This button allows you to change the coefficient of friction from low to high, and place the slider one-fourth of the total distance up from 'none.' Click the Pie Chart check box to show the energy pie chart.
  - a. (1 points) What happens to the skater when friction is added?
  - b. (1 points) How long does it take for the skater to do whatever happens to the skater? Use the Energy vs. Time button to graph.
6. Change the coefficient of friction to three-fourths of the total coefficient of friction.
  - a. (1 points) What happens to the skater now?
  - b. (1 points) How long does it take for the skater to do whatever happens to the skater? Use the Energy vs. Time button to graph.